



Spatial inequality and health of russian population

Desigualdad Espacial y Salud de la Población Rusa

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ABSTRACT:

The article deals with the relationship between industrialization and urbanization and their impact on the quality of life in cities. The growth of most modern cities was associated with the industrial stage in their development, however, the transition to the post-industrial phase of society's development in the second half of the 20th century led to the de-industrialization of urban development. During this period, the problem of the influence of industrial enterprises on the state of the environment and the health of the population becomes urgent, one of the solutions is locating industry outside of large settlements. The implementation of a sustainable development program adopted by member states of the United Nations provides for solving problems of improving the environmental situation in modern cities in order to improve the health of their inhabitants and, as a result, reduce the burden on health systems. According to WHO, environmental pollution (air, water, soil) is a key factor of many diseases in urban environments due to the impact of industrial and economic facilities on it. The ecological situation in the Russian urban centers remains an important topic for researchers. Since the beginning of the 1990s, there has been a cardinal change in the environmental situation in Russian cities, which was caused by structural changes in the country's economy. At the same time, critical indicators of the index of anthropogenic impact remain in industrial cities, for example with mining. These data allow to consider the living conditions in industrial cities as

RESUMEN:

El artículo analiza la relación de la industrialización y la urbanización en términos de su impacto en la calidad de vida en las ciudades. El crecimiento de la mayoría de las ciudades modernas estuvo asociado con la etapa industrial de su desarrollo; sin embargo, la transición a la fase postindustrial del desarrollo de la sociedad en la segunda mitad del siglo XX llevó a la desindustrialización de las ciudades. Durante este período, el problema de la influencia de las empresas industriales en el estado del medio ambiente y la salud de la población se vuelve urgente, se plantea la cuestión de la necesidad de llevar a la industria fuera de los grandes asentamientos. La implementación de un programa de desarrollo sostenible adoptado por los estados miembros de la ONU proporciona la solución de tareas para mejorar la situación ambiental en las ciudades modernas con el fin de mejorar la salud de sus habitantes y, como resultado, reducir la carga de los sistemas de salud. Según la OMS, un factor clave que influye en el desarrollo de una serie de enfermedades en los entornos urbanos es la contaminación ambiental (aire, agua, suelo) debido a la exposición a instalaciones industriales. La situación ecológica en las ciudades rusas sigue siendo un tema importante para los investigadores. Desde comienzos de la década de 1990, ha habido un cambio cardinal en la situación ambiental en las ciudades rusas, que fue causado por cambios estructurales en la economía del país. Al mismo tiempo, en las ciudades, cerca de donde se ubican los objetos de la industria minera y de procesamiento, se mantienen los indicadores

dangerous for the health and lives of their residents; statistics of the structure of morbidity for such regions confirm it. The conclusion is made about the existence of spatial inequality in modern Russia, which can be reduced by the modernization of industrial enterprises located near major cities. This will avoid the deterioration of public health, while maintaining economic advantages in the form of jobs that can provide a stable income.

Keywords: industrial cities, environmental pollution, inequality, residents' health

críticos del índice de impacto antropogénico. Estos datos nos permiten considerar las condiciones de vida en ellos como peligrosas para la salud y la vida de sus personas, lo que se confirma en las estadísticas de la estructura de morbilidad de dichas regiones. El artículo hace una conclusión sobre la existencia de desigualdad espacial en la Rusia moderna, que puede reducirse mediante la modernización de empresas industriales ubicadas cerca de grandes ciudades. Esto evitará el deterioro de la salud pública, al tiempo que mantendrá ventajas económicas en forma de empleos que pueden proporcionar un ingreso estable.

Palabras clave: ciudades industriales, contaminación ambiental, desigualdad, salud de los residentes

1. Introduction

The 21st century became the age of cities, demonstrating a great "urban turn" by the rise of number of cities all over the world. The new ways and methods of the urbanization are the main differences as compared to the previous urban period. Cities have existed for several millennia. Fast urbanization in all countries, however, is a process caused by the development of industrial production (Vershina et al., 2017). Urban centers formed in the preceding historical epochs as single entities due to the development of mechanical and industrial arts and trade (Weber, 2017). Industrialization is now becoming the determining factor in the rising of new cities, but it is changing them compared to previous periods and is reconstructing their social space in a new way, which leads to a radical change in the living conditions of city dwellers. The industrial revolution caused cardinal changes in major European cities at the turn of the XVIII-XIX centuries: factories and plants became the key factors of their socio-economic development and took the functions of urban centers from the town halls and shopping areas.

In the second half of the twentieth century, the problem of the industrial impact on the environment and health of the population became essential. It led to the idea of moving the industry outside of large cities. The pro-environmental model developed in the public consciousness and in activities of international organizations together with the globalization growth. It caused the transfer of industrial capacities to developing countries and the partial de-industrialization of an array of cities in the Old and New Worlds. This trend was intensified by the geopolitical processes of the late 20th century related to the destruction of the socialist bloc. Meanwhile, the imperative status of environmental requirements was standardized in fundamental international agreements prepared with the participation of the United Nations (UN). A new stage in the social development based on digital technology requires not only a higher level of knowledge and a larger competence, but also a high spiritual culture, environmental consciousness and responsibility (Kal'ner, 2018).

This article aims at analyzing the spatial inequality in Russia caused by the impact of the industrial environment on the welfare and health of citizens.

2. Methodology

Origin of power and the following rise of inequality based on unequal distribution of benefits and privilege in the society is a constant subject of political disputes and discussions in the academic community. Analysis of multiple concepts of social inequality developed by classic sociologists and contemporary scholars allows giving aggregative definition to the phenomenon. Along with economic inequality, there were and still are other traditional types of the social inequality (Osipova, 2014; Polyakova, 2015), and spatial inequality is one of them. Nowadays the significance of spatial inequality is rising because most of world population is urban and cities play another role in world economy (Dobrinskaya et al., 2018). This article describes features of the spatial inequality in contemporary Russia.

The implementation of a sustainable development program adopted by UN member states provides for addressing tasks aimed at improving the environmental situation in modern cities in order to improve the health of their dwellers and, as a result, reduce the load on

health care services (Agenda 21, 1993). On the other hand, moving the industrial production outside cities leads to job losses, which negatively affects the welfare of certain social strata, depriving them of a stable revenue source. Therefore, there is a need to find relevant ways to solve the problem (Ahn, 2007; Latham, 2000; Powell, 1999).

3. Results

3.1. Industrial Areas in Modern Cities

The emergence and development of industrial enterprises contributed to the job growth. The population shifted massively from rural to urban areas, which gradually developed into industrial centers.

The situation changed, however, after the World War I. The “community architecture” movement was spreading actively. It was aimed at designing standard cheap housing and building industrial communities and residential areas. The municipal socialism programs constituted its conceptual framework (Polevoy, 1991). Representatives of the architectural functional style proposed cheap solutions for mass housing.

When the housing problem became less urgent, the attitude changed towards industrial enterprises and industrial cities. The low cost housing for workers improved living conditions significantly. The movement of people from rural areas increased, industrial enterprises were viewed as a stable revenue source and a symbol of the progressive urban development. The urbanization was then seen as a key factor stimulating the industrial production growth, as well as its transition to the high-tech development stage (Liadova et al., 2017). The period of rapid urban expansion started. It was caused by the construction of working class residential areas. In the first half of the twentieth century, when a number of industrial enterprises had already been built or were under construction, the urban growth led to the fact that a significant number of industrial areas turned out to be in the city centers or close to them. The territory of Moscow expanded in the twentieth century in a similar way. Because of that, for example, the “Likhachev” plant (ZIL) was located near the modern capital center.

Nowadays, researchers point out at three main directions of transforming contemporary urban industrial areas in terms of their functional load:

- preservation of the original (industrial) function with the transformed territory;
- partial change in the functional load;
- complete change in the functional load (Vershina et al., 2018).

The preservation of the industrial function of the transformed territory usually means a major modernization of production facilities, often followed by a change in their specialization and a transition to new production technologies following current environmental standards and economic requirements.

As a rule, the second direction includes the reconstruction of the planning structure. In this case its key elements and interrelations are preserved, its certain parts may be turned into museums (e.g., an industrial reserve museum may be established), and new urban areas may be included in the historically formed industrial territories (Grakhov et al., 2016).

3.2. Main Features of Russian Urbanization

In the view of some analysts, in Russia there is a characteristic distinction between the center and the periphery and central regions are considered to be preferable. This applies to individual cities and the whole country. Significance of the two major cities, Moscow and St. Petersburg, continually increased since the times of the Russian Empire. These two cities traditionally attract people from different regions of the country being a center of various resources.

According to the 1897 Census, population of Moscow and St. Petersburg listed among the 10 biggest cities of the world was over a million, while the third-largest city of the country (on the territory of modern Russia) was ten times smaller than the other two. Population of

Saratov was a little over 100 thousand people (The First Russian Imperial Census, 1905). Thus, by the beginning of the twentieth century, when the percentage of urban population was 16%, a disproportional settlement system with a population concentration in two capitals and large distances between cities developed on the territory of modern Russia.

Another problem inherited from the Russian Empire is the lack of large and medium-sized cities and, as a consequence, large distances between them and failing infrastructure which is acquiring a strategic importance in the modern world.

The most intensive urbanization phase was during the Soviet period when two-thirds of present cities were constructed and the percentage of urban population increased up to 75%. Urbanization was a result of forced industrialization, characterized by centralized rigorous regulation of urban development with minimization of costs per person and marginality of urban population (Pivovarov, 2001). However, certain urbanization characteristics of the Russian Empire were preserved.

Moscow and St. Petersburg remain the biggest cities concentrating about 10% of the country population. They also represent about 30% of the country's GDP and about half of world trade (Zubarevich, 2015). Salaries in these cities are higher than in a number of other regions, which contributes to steady influx of internal migrants. This negatively affects the development of surrounding regions that experience a loss of human resources leading to reduction of the capacity for future growth.

Studies show that cities leading in human capital development are located away from Moscow and St. Petersburg. Adjacency to the two biggest agglomerations in the country provoke internal migration and prevent balanced development of urban areas in close proximity of the cities. Irrespective of the city size, human capital development is connected with the population growth, that is why outflow of labor resources is pernicious for cities.

However, it is necessary to consider objective reasons for disproportional urbanization of the country territory. Considerable parts of Russia are behind the Arctic Circle or in close proximity of it which leads to low population density of the huge territory as it is uncomfortable for living due to its climatic conditions. Any construction works in that territory require large material, financial and intellectual resources and creation of infrastructure networks and their operation are quite expensive for the state and people. Cities in severe climate conditions are, as a rule, the consequence of development of mineral deposits or the result of implementation of the strategic objectives of the country.

Today incompleteness and nonuniformity of urbanization in Russia is a serious problem as connectivity is becoming a key factor of economic and political success on a global basis but its achievement requires extensive improvement of the existing infrastructure and creation of a new one. Urbanization goals that are on today's agenda have changed little over the last 100 years: the country needs alternative centers of attraction of people and resources. Cities of different sizes can become a basis for modernization and economic growth that is why it is necessary to build various strategies of their development.

3.3. The Impact of the Urban Environment on the Health of Residents

Danish architect J. Gale pointed to the fact that the functional architectural style prevailed in the intensive urban construction in the twentieth century (Gehl, 2011). Its ideas were most clearly established in the instructions and construction rules and regulations that became the basis for the work of architects and designers during the most important decades, when urban borders expanded rapidly in industrialized countries. However, modern researchers (architects, psychologists, sociologists, etc.) note the negative impact of such areas on people's physical and mental health (Osipova, 2016).

The first large-scale survey was conducted at the beginning of the last century regarding the negative impact of industrial areas on the environment and, as a consequence, the health of the population living in them (Buer, 1926; Griffith, 1926). After the formation of the World Health Organization (WHO) in 1946, the study of the influence of cities on the public health,

previously conducted at the local level, as well as the development of appropriate measures to improve the public health, became one of the priorities in the work of international organizations aimed at achieving a high level of health and welfare (Constitution of WHO, 1946). At the end of the 1980s, at the initiative of the WHO, the Healthy City project was launched in a number of industrial cities in Europe and North America. In the 1990s, some Pacific countries, such as Australia, Japan and New Zealand joined the project. In 1991, the World Health Assembly adopted a resolution aimed at developing programs for the prevention and control of the adverse effects of fast-growing cities on the public health (World Health Assembly Resolution, 1991). Following the discussions in 1992, the Healthy Urban Environment Program was adopted, which became the basis for the development of national projects in this area.

In 1995, the WHO established the WHO Kobe Center, the activities of which were aimed at studying the impact of cities on the public health in different world regions. The studies showed that 63% of the total death rate in the world (which is 36 million deaths per year) was due to non-communicable diseases, including cardiovascular diseases, which accounted for 17.7 million deaths per year, cancer and respiratory diseases causing 8.8 million and 3.9 million deaths each year, respectively (Urbanization and Health, 2010). According to the WHO report "Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks", the key factor affecting the development of these diseases in urban areas is environmental (air, water, soil) pollution due to the impact of industrial and commercial facilities on it (Global report on urban health, 2016). The high rate of urbanization, as well as the continuing growth of modern large cities make prospects for future development rather dark. Moreover, experts fear that such high rates of non-communicable diseases may threaten the implementation of the sustainable development goals of the world community established in the Sustainable Development Agenda 2030.

3.4. Unequal Distribution of Health Risks in Contemporary Russia

Although according to the ranking of the most polluted cities in the world, Russian cities cannot be compared to such "anti-leaders" as Onitsha (Nigeria), Zabol (Iran), Peshawar and Karachi (Pakistan), the ecological situation in Russian urban centers is still a hot topic among researchers (WHO Global Urban Ambient Air Pollution Database, 2016). According to experts, the environmental situation has changed radically in Russian cities since the beginning of the 1990s. This was caused by structural changes in the state economy as a result of adaptation to new business conditions (Bityukova, 2015). According to the environmental rating of 2015, the calculation of the integral index of the anthropogenic environmental impact intensity in 1100 cities of Russia showed that the highest level of impact on the atmosphere was established for cities with coal energy and heavy industrial structure, which became centers of the mining and metallurgical industry development (Bityukova, 2015). According to experts, critical indicators of the anthropogenic impact index were identified for such cities as Moscow, Novosibirsk, Krasnoyarsk, Irkutsk, Khabarovsk, Tula, Kemerovo, Zapolyarny, Tyumen, Chelyabinsk, Magnitogorsk, Voronezh (Bityukova, 2015). Moreover, an increase in atmospheric pollution was observed in cities with a population of over 500 thousand people due to industrial influence (Bityukova, 2015). The monitoring data give reason to consider living conditions in them as dangerous (and in some cases critical and unacceptable) for life and health of people.

This situation is confirmed in the statistics of morbidity patterns: according to the Russian Federal State Statistics Service, non-communicable diseases of the cardiovascular and respiratory systems occupied the leading position in the morbidity patterns in 2016 (Health care in Russia, 2017). Moreover, data on these disease groups indicate a critical situation in some regions. Thus, there is an excess incidence of respiratory and circulatory diseases among the Norilsk population, although the dynamics of these indicators is characterized as stably regressive in Russia and in the Krasnoyarsk Krai over the same period. Experts indicate that this situation is caused by the high level of pollutants emitted by the city-forming enterprise: Norilsk Nickel Mining and Smelting Works (Kurkatov et al., 2015).

A similar situation is in Chelyabinsk region, that has been one of the leading industrial centers of our country since the time of Peter the Great, and where non-ferrous, steel-making, fuel energy, mining and processing enterprises are accumulated. Due to the high concentration of carcinogenic substances such as sulfur dioxide, benzopyrene, manganese, chromium, lead and its compounds, nickel, formaldehyde in the atmosphere of this region, Chelyabinsk region has been in the risk zone for the incidence of malignant tumors for several years (Efremova et al., 2014). According to experts, "death rate from the following malignant tumors is the highest in Chelyabinsk region: malignant tumors of trachea, bronchial tube, lungs – 20.1%, stomach – 13.8%, mammary gland – 8.5%, colon – 7.4%; rectum – 6.0%. Arsenic is the main substance contributing to multi-environmental carcinogenic risk: the carcinogenic risk is 9.55×10^4 (third-range risk) in Magnitogorsk (70.4%); the carcinogenic risk is 7.8×10^4 (third-range risk) in Chelyabinsk (81.4%); the carcinogenic risk is 7.5×10^5 (second-range risk) in Karabash (91.5%)"(Efremova et al., 2014).

An unacceptable content of hazardous substances was also recorded in the atmosphere of Kemerovo region due to the concentration of coal mining and coal processing enterprises here. According to the research, the population of the cities of Kemerovo region, in which these enterprises are located, is exposed to lifelong carcinogenic risk (Mun, 2013).

Despite the great opportunities and increased attention of the Moscow authorities to the ecological situation, the metropolitan city, as well as the industrial urban areas listed above, has been considered a bad place for comfortable living (in the environmental aspect) for many years due to the presence of industrial facilities within urban area, and therefore, within the residential areas. These industrial facilities have long been the stumbling point in the competition for the title of the "Healthy and comfortable city" (Moscow is a city convenient for life, 2014). According to experts, industrial enterprises located in the South-Eastern and Southern administrative districts have the most negative impact on the level of air and soil pollution (Yablokov, 2012). Therefore, these districts are considered environmentally unfriendly and dangerous to live. For example, one of them is Kapotnya. Until recently its name firmly associated with the smell of hydrogen sulfide and the operation of the Moscow Oil Refinery (Yablokov, 2012). According to statistics, the most common non-communicable diseases among Muscovites living close to the plant are diseases of the cardiovascular system, respiratory organs, eyes and malignant tumors, which, according to the research performed by the International Agency for Research on Cancer, are caused by external factors (Yablokov, 2012).

Thus, the spatial inequality is quite obvious in contemporary Russia. The immediate neighborhood of some industrial enterprises has a negative impact on the public health and welfare. However, the modernization of such enterprises can reduce the adverse effects on the neighboring territories, while retaining certain advantages, such as jobs providing a regular income.

4. Conclusions

According to modern researches, the main possible explanations for spatial inequity are economic stratification and urban ecology (Daniels et al., 1999; Korkia et al., 2017). Urbanization and industrialization are mechanisms of spatial inequality through which disadvantaged residents and toxic pollution come together in space. Health of urban residents depends on industrial location; this situation is one of the features of industrial countries including Russia.

Thus, new trends in socio-economic development raise the issue of modernization of residential areas in industrial cities, primarily in order to turn them into safe and comfortable areas. This is a large step towards achieving sustainable development, preserving and enhancing social capital.

In our opinion, turning to the idea of adaptive reuse becomes one of the means of revitalizing the urban landscape and, consequently, urban living. The United Nations call for a dynamic, sustainable and inclusive urban economy that would rely on domestic potential, competitive advantages, cultural heritage and local resources, as well as a resource-efficient

and sustainable infrastructure. This requires supporting sustainable and inclusive industrial development, adopting sustainable consumption and production patterns, contributing to the creation of favorable conditions for business and innovation, as well as sources of livelihood (New Urban Agenda, 2017).

It is obvious that cities as industrial centers have a dual impact on the public health: on the one hand, the industrial development contributes to the economic well-being of their dwellers, as it causes job creation, improvement of social infrastructure, and the inflow of investments. On the other hand, its inevitable consequence is an increase in the anthropogenic load on the environment, which leads to an increase in the dangerous impact on the public health and welfare.

But, despite the fact that the opponents of urbanization (especially in its radical form) are disturbed by the negative features of this process, such as environmental problems and, consequently, the deterioration of the health of the urban population, the urban growth continues, and this trend is quite objective (Liadova et al., 2017). Therefore, relevant solutions must be developed to minimize possible negative impact.

The transition from the industrial development of society to the post-industrial development dramatically changes the appearance of cities. A number of capital buildings, which constitute a significant part of the architectural space of a typical industrial city, do not meet new social trends. They include old hospitals, health resorts, military and administrative buildings. The issue of reuse is particularly essential concerning industrial facilities, since the de-industrialization rate completely changed the nature of social processes in many cities of the Old and New Worlds in the second half of the 20th century. Entire industrial complexes become empty due to industry offshoring to developing countries, although these complexes have already been integrated into urban space for a long time. This leads to the emergence of a "no-man's land" in the very center of the urban landscape.

Today, the imperative of extending the life cycle of architectural structures can be considered as a practical embodiment of the sustainable development paradigm, since the issues solved by this process completely fit into the system of priorities set by this paradigm. Such issues include minimizing building rates (preservation and optimal use of urban space), preserving primary materials and reducing energy costs for the demolition of architectural objects and the implementation of new construction from scratch.

One shall also keep in mind that industrial production is changing, the Internet of things is actively developing, there is a program for the accelerated transfer of industrial production to online, modernization of existing enterprises is underway, and new productions can and should be immediately created digitally (Kal'ner, 2018; Martynenko et al., 2018). Thus, both the adaptive reuse of industrial areas and the reconstruction of existing enterprises can be considered the optimal model for the contemporary urban development.

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